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Application No. 10/810,471  
Reply to Office Action of September 21, 2009

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (currently amended) A system for co-production of hydrogen and electrical energy comprising:

a reformer configured to receive a reformer fuel and steam and produce a reformat rich in hydrogen;

a separation unit in fluid thermal communication with said reformer wherein said separation unit is configured to receive said reformat to separate hydrogen from said reformat and produce an off gas;

~~a combustor in fluid isolation with respect to said reformer,~~ said combustor configured to receive a fuel for combustion and produce heat energy and a hot compressed gas, and

a gas turbine to expand said hot compressed gas and produce electrical energy and an expanded gas;

wherein said reformer and said combustor are separated by a wall configured to avoid material transfer through said wall and at least a part of said heat energy from said combustor is used to produce said reformat in said reformer.

2. (original) The system according to claim 1, wherein at least a part of said off gas is recycled back to said reformer after separation of hydrogen.

3. (original) The system according to claim 1, wherein said reformat further comprises carbon monoxide, carbon dioxide and said reformer fuel.

4. (original) The system according to claim 3, wherein said separation unit further comprises at least one water gas shift reactor to convert carbon monoxide to carbon dioxide to a hydrogen and carbon dioxide rich stream.

5. (original) The system according to claim 1 further comprising a heat exchanger to generate steam.

6. (currently amended) The system according to claim 1, wherein said separation unit further comprises a separating device selected from the group consisting of at least one of a chemical absorber, a pressure swing adsorber, a cryogenic separator, membrane a separator and a liquefier.

7. (original) The system according to claim 4, wherein said separation unit is configured to separate carbon dioxide from said hydrogen and carbon dioxide rich stream.

8. (cancelled)

9. (original) The system according to claim 1, wherein said expanded gas produced from said gas turbine comprises substantially low concentration of carbon dioxide.

10. (currently amended) The system according to claim 1 further comprises a heat recovery steam generator (HRSG) to generate steam and a steam turbine to generate power using at least a portion of said steam from said HRSG.

11. (original) The system according to claim 1 wherein said hydrogen from said separation unit is used to operate a fuel cell system comprising one or more fuel cells to generate electrical energy.

12. (original) The system according to claim 1 further comprising a hydrogen storage unit.

13. (original) The system according to claim 1, wherein said off gas from said separation unit is recycled into said combustor.

14. (original) The system according to claim 1, wherein said off gas is burned in a secondary combustor.

15. (currently amended) A system for co-production of hydrogen and electrical energy comprising:

a reformer configured to receive a reformer fuel and steam and produce a reformat rich in hydrogen;

~~a combustor in fluid isolation with respect to said reformer, said combustor~~ configured to receive a fuel for combustion and produce heat energy and a hot compressed gas;

a separation unit in fluid communication with said reformer wherein said separation unit is configured to receive said reformat to separate hydrogen from said reformat and produce an off gas, ~~wherein at least a part of said heat energy from said combustor is used to produce said reformat in said reformer; and~~

a gas turbine to expand said hot compressed gas and produce electrical energy and an expanded gas;

wherein said reformer and said combustor are separated by a wall configured to avoid material transfer through said wall and at least a part of said heat energy from said combustor is used to produce said reformat in said reformer and said separation unit is configured to separate carbon dioxide from said reformat and recycle at least a part of said off gas to said reformer.

16. (original) The system according to claim 15, wherein said reformat further comprises carbon monoxide, carbon dioxide and said reformer fuel.

17. (original) The system according to claim 16, wherein said separation unit further comprises at least one water gas shift reactor to convert carbon monoxide to carbon dioxide to a hydrogen and carbon dioxide rich stream.

18. (currently amended) The system according to claim 16, wherein said separation unit further comprises a separating device selected from the group consisting of at least of a chemical absorber, a pressure swing adsorber, a cryogenic separator, membrane a separator and a liquefier.

19. (original) The system according to claim 17, wherein said separation unit is configured to separate carbon dioxide from said hydrogen and carbon dioxide rich stream.

20. (currently amended) A method for co-production of hydrogen and electrical energy comprising the steps of:

reforming a mixture of a reformer fuel and steam in a reformer and producing a reformat rich in hydrogen;

separating hydrogen from said reformat and producing an off gas;

combusting a fuel in a combustor and producing heat energy and a hot compressed gas,  
~~wherein said combustor is in fluid isolation with respect to said reformer; and~~

expanding said hot compressed gas in a gas turbine expanding and producing electrical energy and an expanded gas;

wherein said reformer and said combustor are separated by a wall configured to avoid material transfer through said wall and at least a part of said heat energy from said combustor is used to produce said reformat in said reformer.

21. (original) The method according to claim 20 further comprising recycling at least a part of said off gas back to said reformer after separation of hydrogen.

22. (currently amended) A combustor reformer system comprising:

a combustor configured to receive a fuel and an oxidant for combustion and production of a hot compressed gas and heat energy, and

~~a reformer in fluid isolation with respect to said combustor, said reformer~~ configured to receive a reformer fuel and steam and produce a reformat rich in hydrogen ;

wherein said reformer ~~is in fluid isolation with respect to with~~ and said combustor are separated by a wall configured to avoid material transfer through said wall and at least a part of said heat energy from said combustor is used to produce said reformat in said reformer.